APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/524,758	11/14/2005	Koji Aoyama	SON-2803	6895

23353   7590   01/09/2008
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EXAMINER
BLOOM, NATHAN J

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
01/09/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

		Application No.	Applicant(s)
Office Action Summary		10/524,758	AOYAMA ET AL.
		Examiner	Art Unit	
		Nathan Bloom	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 February 2005*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *17-19* is/are allowed.

6)☒ Claim(s) *1-9 and 13-16* is/are rejected.

7)☒ Claim(s) *10-12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date *02/11/2005, 11/29/2007*.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____ .

DETAILED ACTION

Requirement For Information

Applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that the examiner has determined is reasonably necessary to the examination of this application.

In response to this requirement, please state whether any search of prior art was performed. If a search was performed, please state the citation for each prior art collection searched. If any art retrieved from the search was considered material to demonstrating the knowledge of a person having ordinary skill in the art to the disclosed image reproducing apparatus and image reproducing method, please provide the citation for each piece of art considered and a copy of the art. If the art considered is written in applicant's native language, applicant is held to understand the materiality of the art and is required to disclose the materiality. Therefore, for each piece of art considered that is written in applicant's native language, please identify the portions of the art that were considered material as well as a concise explanation in the English language of the material portions. If a rejection was made in a corresponding foreign application based on any of the art considered, please provide a copy of the rejection.

For example, if the Japanese Patent Office issued a rejection in the corresponding Japanese application, please submit a copy of the Japanese rejection. As another example, if a corresponding application has been filed in Europe and has received a rejection, please submit a copy of the rejection.

Furthermore, applicants' have disclosed the status of the prior art in the specification.

Examiner referenced this information in the rejections and requests that any references relied

upon for this description is included so that the patentability of this application can be properly

assessed.

This information is relevant to patentability.

Applicant is reminded that failure to fully reply to this requirement for information will

result in a holding of abandonment. This requirement is an attachment of the enclosed Office

action. A complete reply to the enclosed Office action must include a complete reply to this

requirement. The time period for reply to this requirement coincides with the time period for

reply to the enclosed Office action.

Claim Rejections - 35 USC § 112

1.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2.   Claims 5-6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for

failing to particularly point out and distinctly claim the subject matter which applicant regards as

the invention. The limitation of claim 6 wherein it is stated "data obtaining means for obtaining

from said storing means said horizontally correct image according to said vertical correcting

parameter" is unclear as it appears to be stating that is obtaining the horizontally corrected image

according to a parameter. It appears from applicants' own disclosure that the horizontally

corrected image should be obtained and then adjusted based on the vertical parameter, but not

"obtained according to". Similarly, the phrase " first data obtaining means for selectively

obtaining said image data at said pixels points according to an integer component of said

horizontal correcting parameter" of claim 5 and "second data obtaining means for selectively

obtaining said image data at said pixel points according to an integer component of said vertical

correcting parameter " of claim 5 are unclear as since the term obtaining is typically used in a

sense of retrieving or acquiring and does not include the adjustment or correction of data in some

manner. These limitations will be interpreted as the correction or adjustment of the obtained

image data based on these parameters.

Claim Rejections - 35 USC § 103

1.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

2.   Claims 1-2 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Enomoto (US 2002/0196472) in view of Applicants' admitted prior art.

Instant claim 1: An image processing apparatus including image correcting means for correcting

an original image having distortion according to a supplied correction vector, characterized by

comprising: decoding means for decoding said correction vector, which is supplied from a

correction parameter deriving unit in accordance with a control signal from the outside, and

supplying said decoded correction vector to said image correcting means. [*Enomoto teaches the*

storing (encoding in digital form) and acquisition (decoding or interpreting of stored

information) of lens characteristic information in paragraphs 0126-0127, 0141, and 0145, and

in paragraphs 0148-0154 teaches the correction of the known distortion of the particular lens

using the acquired (decoded) information. Enomoto in paragraphs 0172-0176 teaches the

correction of the distortion, but does not teach the use of a correction parameter deriving unit

and correct vector or the use of an external control signal for controlling the correction of the

image. However, as established by the applicants' in the "Background Art" section and figures

33-37 (referred to as prior art) the use and derivation of correction vectors and coefficients

(parameters) as stated in paragraphs 0005,0008, 0011, and 0014-0016 of the specification.

Also, in paragraph 0007 of applicants' specification the use of an external control signal

provided by a user was stated as conventional knowledge to one of ordinary skill in the art. In

particular, paragraph 0152 of Enomoto teaches that the lens information includes information

about the distortion of the lens, but it does not specify what this data is. It would have been

obvious to combine the teachings of Enomoto with the knowledge of one of ordinary skill in the

art (as stated by applicant) to improve the correction process taught by Enomoto by including

conventional distortion correction information as part of the lens characteristic information

stored and associated with the particular lens type.]

Instant claim 2: The image processing apparatus according to claim 1, characterized by further

comprising: decoding control means for selectively decoding said correction vector by issuing a

command according to an input to a user interface to said decoding means. [*See rejection of*

instant claim 2.]

Instant claim 8: An image processing system including image correcting means for correcting an

original image having distortion according to a supplied correction vector, characterized by

comprising:

encoding means for encoding said correction vector, which is supplied from a correction

parameter deriving unit in accordance with a control signal from the outside, corresponding to a

pixel point constituting said original image; and [*As per the rejection of claim 1 Enomoto in view*

of Applicants admitted prior art the decoding and encoding of correction parameters was known.

However, nothing is stated by either Enomoto or Applicants disclosure by the derivation of the

parameters. Examiner takes official notice that the derivation of and means for deriving these

parameters was notoriously well known to one of ordinary skill in the art as is evidenced by the

disclosures of Enomoto and Applicant whom make use of these parameters, which would not

exist unless derived.]

decoding means for decoding said encoded correction vector supplied from said encoding means,

and for supplying said decoded correction vector to said image correcting means. [*As per the*

rejection of instant claim 1 this limitation has been disclosed.]

3.   Claims 3, 7, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Applicants admitted prior art in view of Jasa (US 2003/0020732).

Instant claim 3: An image processing apparatus for correction an original image having

distortion, characterized by comprising,

horizontal correcting means for correcting distortion in the horizontal direction of said original

image by performing one-dimensional interpolation using a horizontal correcting parameter

indicating a correction quantity of the horizontal direction at a pixel point constituting said

original image; and [*The conventional method and means of distortion correction as described*

by the applicant in paragraphs 0002-0022 of the specification includes the 2-D interpolation

based on 2-D based correction parameters (vectors), but not the use of 2 1-D interpolations in

the horizontal directions to perform a 2-D interpolation. However, Jasa teaches the spatial

transformation of images in order to correct for geometric distortion. In paragraphs 0044-0046,

Jasa teaches that it is preferable to transform (correct) images using two one-dimensional

transformation as opposed to one two-dimensional due to the complexity and implementation

issues (listed in abstract of the two-dimensional transformations. This transformation is done by

taking the known 2-D transformation and separating into two 1-D transformations in the

horizontal and vertical directions (paragraph –12). Jasa, in paragraph 0073 shows that this

was applicable to interpolation methods in paragraph 0073. Also, as per paragraphs 0012 and

0045 the division of the transformation of the image into two steps, includes the division of the

transformation into a horizontal step and a vertical step. Jasa discusses in paragraphs 0012 and

0045 the division of the transformation and mapping into a horizontal step and a vertical step

but does appear to state the division of correction parameters into known components.

However, Examiner takes official notice that it would have been notoriously obvious to one of

ordinary skill in the art that this separation would include the separation of any known distortion

factors, vectors, or known correction information required to map the spatial transformation into

both a horizontal and vertical component. Thus, it would have been obvious to improve the

known conventional method and means for correction of geometric distortion by reducing the 2-

D interpolation to two 1-D interpolation steps in the vertical and horizontal directions in order

to (as stated in the abstract of Jasa) reduce calculations, provide efficient memory access, and

provide real-time data processing. Also, Jasa discloses in paragraph 0012 the separation of the

geometrical transformation into two 1D transformations and since in the case of the

conventional art this includes taking a 2-D correction parameter (vector) into]   .

vertical correcting means for correcting distortion in the vertical direction of said original image

by performing one-dimensional interpolation using a vertical correcting parameter indicating a

correction quantity of the vertical direction at a pixel point constituting said original image to an

image obtained by the correction of said horizontal correction means. *[See the above rejection in*

which it would have been obvious in view of the teachings of Jasa to perform the known method

of Macy in two one-dimensional steps. This would require the use of both a horizontal and

vertical correction vector since the vector taught by the conventional art is a 2-dimensional

correction vector.]

Instant claim 7: Claim 7 teaches the limitations of claim 3 wherein the vertical correction is

performed prior to the horizontal correction, or in other words the order of correction is reversed.

[As per the rejection of claim 3 the limitations of claim 7 have been taught, but not in the current

claims order. However, Examiner takes official notice that it was notoriously well known to one

of ordinary skill in the art that the order of corrections could be performed in either order since

the order of the correction does not change the result, which is a distortion corrected image.]

Instant claim 14 claims the method performed by the means of claim 3, and as per the rejection of instant claim 3 the means and thus the method it performs have been taught.

4. Claims 4-6 and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants disclosure of the prior art and Jasa as applied to claim 3 above, and further in view of Macy (US 6538691).

Instant claim 4: The image processing apparatus according to claim 3, characterized in that: said horizontal correcting means expands and contracts said original image in the horizontal direction by adjusting an interval in the horizontal direction of pixel points at which image data is obtained by said one-dimensional interpolation operation; and in that: said vertical correcting means expands and contracts said original image in the vertical direction by adjusting an interval in the vertical direction of pixel points at which image data is obtained by said one-dimensional interpolation operation. [*According to Applicants disclosure of the prior art and as is evidenced by Macy the interpolation is for adjusting the values of the pixels based on the geometrical transformation (expansion and contraction) described by the correction vectors. Applicants disclosure of the prior art does not go into detail about this step. However, Macy teaches in column 3 lines 4-27 the distortion (expansion and contraction) of the original image in both dimensions in order to adjust the position (interval) of pixel points in the camera grid to the desired position (desired is meant as original undistorted position) as is depicted by the monitor grid. Furthermore, as per the rejection of instant claim 3 the separation of the distortion*

correction into a horizontal and vertical correction has been taught by Applicants disclosure of

the prior art in view of Jasa.]

Instant claim 5: The image processing apparatus according to claim 3, characterized in that:

said horizontal correcting means includes

first data obtaining means for selectively obtaining said image data at said pixels points

according to an integer component of said horizontal correcting parameter, [*Applicants*

disclosure of the conventional prior art in paragraphs 0005, 0008, 0011, and 0014-0016 of the

specification Applicants state that the use and acquisition of the integer component of the

correction parameter.]

first interpolation coefficient generating means for generating an interpolation coefficient

according to a decimal component of said horizontal correcting parameter, and [*Applicants*

disclosure of the prior art also teaches that the interpolation generating means of figure 35

acquires the decimal component of the correcting parameter and generates the interpolation

coefficient based on it. Also, as per the rejection of instant claim 3 the separation of the

interpolation and hence the correction parameters into horizontal and vertical components was

taught by Applicants disclosure in view of Jasa and the knowledge of one of ordinary skill in the

art.]

first interpolation operating means for executing said one-dimensional interpolation operation

using said image data obtained by said first data obtaining means and said interpolation

coefficient generated by said first interpolation coefficient generating means; and in that:

[Applicants disclosure of the prior art in paragraphs 0015-0022 teaches the interpolation based on the image data obtained by vector correction and the obtained interpolation coefficient.]

said vertical correcting means includes

second data obtaining means for selectively obtaining said image data at said pixel points

according to an integer component of said vertical correcting parameter,

second interpolation coefficient generating means for generating an interpolation coefficient

according to a decimal component of said vertical correcting parameter, and

second interpolation operating means for executing said one-dimensional interpolation operation

using said image data obtained by said second data obtaining means and said interpolation

coefficient generated by said second interpolation coefficient generating means. *[See above and the rejection of instant claim 3 wherein the separation of the interpolation into a vertical and horizontal component was taught by Applicants disclosure of the prior art and Jasa in view of.]*

Instant claim 6: The image processing apparatus according to claim 3, characterized by further

comprising:

storing means for storing a horizontally corrected image obtained by the correction of said

horizontal correcting images; *[Figure 13 of Jasa shows the Horizontal filter engine that performs the horizontal interpolation (paragraph 0114), and an intermediate image that has been horizontally corrected is stored (figure 13 depicts a hardware implementation and thus each step represents a component).]*

wherein said vertical correcting means includes

data obtaining means for obtaining from said storing means said horizontally correct image

according to said vertical correcting parameter, and [*See figure 13 of Jasa wherein the*

intermediate image is transferred (and hence obtained by) to and then transformed according to

the vertical mapping and then corrected by the interpolation of the Vertical filter engine that

performs the vertical interpolation.]

interpolation operating means for performing a one-dimensional interpolation using said vertical

correcting parameter to said horizontally corrected image data obtained by said data obtaining

means. [*Corrected image is the output image of paragraph 0114 as depicted by figure 13*

(Jasa).]

Instant claims 15 and 16 claim the method performed by the means of claims 3-4 and 6, and as

per the rejection of instant claim 3-4 and 6 the means and thus the method it performs have been

taught.

5.   Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Enomoto in view

of Applicants' admitted prior art as applied to claims 1 and 8, in further view of Jasa as applied to

claim 3.

Instant claim 9: An image processing system for correcting an original image having distortion,

characterized by comprising:

encoding means for selectively encoding a horizontal correcting parameter indicating a

correction quantity in the horizontal direction at a pixel point constituting said original image and

a vertical correcting parameter indicating a correction quantity in the vertical direction at said

pixel point; [*As per the rejection of claims 1 and 8 the encoding and decoding of the parameters*

has been taught by Enomoto and the Applicants admitted prior art, but do not teach the encoding

and decoding of a horizontal and vertical parameter. As per the rejection of claims 3 the

Applicants admitted prior art in view of Jasa taught the separation of parameters and the one-

dimensional interpolation in both the horizontal and vertical direction in order to improve the

efficiency of the calculations. In particular Jasa teaches in paragraphs 0067-0068 and figures

3A-3F the inverse mapping using vectors in which the vectorial correction is performed in first 1

direction and then the other. It would have been obvious to combine the teachings of Enomoto

and Jasa to improve the efficiency of the distortion correction algorithm as taught by Enomoto in

view of Applicants admitted prior art.]

horizontal decoding means for decoding said encoded horizontal correcting parameter supplied

from said encoding means; [*See above.*]

horizontal correcting means for correcting distortion in the horizontal direction of said original

image by performing a one-dimensional interpolation operation using said horizontal correcting

parameter decoded by said horizontal decoding means to said original image; [*As per the*

rejection of instant claim 3 these limitations have been taught by the Applicants admitted prior

art in view of Jasa.]

vertical decoding means for decoding said encoded vertical correcting parameter supplied from

said encoding means; and [*See above.*]

vertical correcting means for correcting distortion in the vertical direction of said original image

by performing a one-dimensional interpolation operation using said vertical correcting parameter

decoded by said vertical decoding means to said image obtained by the correction of said

horizontal correcting means. [*See above.*]

6.   Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants

disclosure of the prior art, Enomoto and Jasa as applied to claim 9 above, and further in view of

Macy (US 6538691).

Instant claim 13: As per the rejection of claims 9 and 6 the subject matter of this claim has been

taught. Furthermore, the teachings of Macy were relied upon to evidence that the limitations of

claim 6 were an implicit part of the conventional distortion correction method as taught by

Applicants disclosure of the prior art.

Allowable Subject Matter

7.   Claims 17-19 are allowed.

8.   The following is a statement of reasons for the indication of allowable subject matter:

Claims 17-19 contain the limitation of splitting the grid according to a control signal supplied

from a user interface. This limitation in conjunction with the limitations of encoding, decoding,

and interpolation was not found in the known prior art as indicated below by the reasons for

indicating allowable subject matter (claims 10-12).

9.   Claims 10-12 are objected to as being dependent upon a rejected base claim, but would

be allowable if rewritten in independent form including all of the limitations of the base claim

and any intervening claims.

Claim 10 contains the limitation that the encoded data is split into a grid according to a control

signal from the user interface. The prior art teaches the encoding of data by splitting of the grid,

but not based on a user input. As per the request for information above, any known material

related to this limitation should be disclosed. Furthermore, claims 11-12 depend from 10 and

thus also contain allowable subject matter.

Conclusion

10.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure.

- Nijmeijer, "Correction of Lens-Distortion for Real-Time Image Processing Systems"

  - teaches one-dimensional interpolation and the use of correction vectors to distort the

  image to a grid.

- Taraine (US 5048102) – distortion correction process using interpolation.
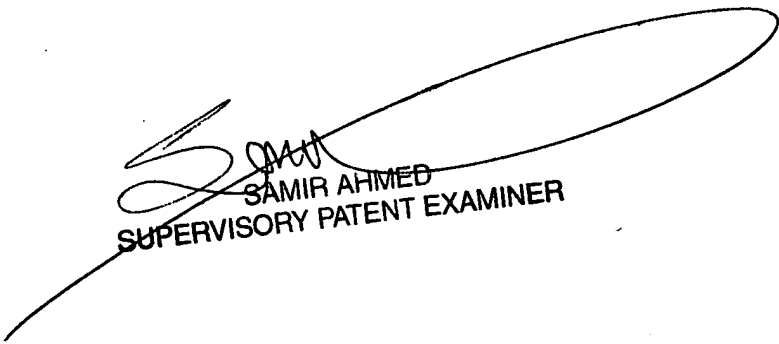

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan Bloom whose telephone number is 571-272-9321. The examiner can normally be reached on Monday through Friday from 8:30 am to 5:00 pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed, can be reached on 571-272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NB

SAMIR AHMED
SUPERVISORY PATENT EXAMINER